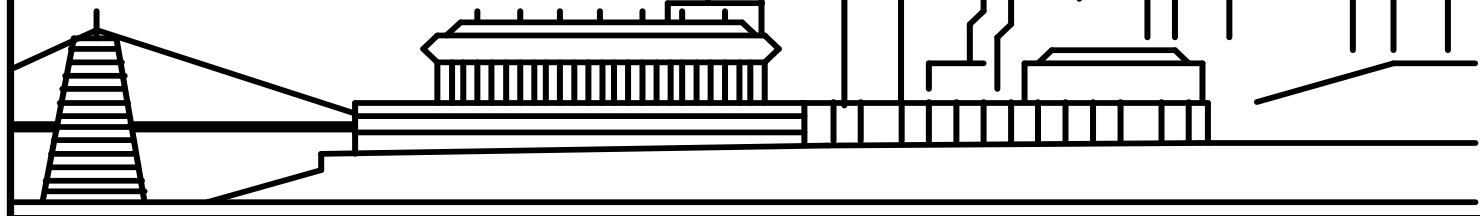




INSTITUTE OF
ELECTRICAL &
ELECTRONICS
ENGINEERS, INC.



OCTOBER 1999

IEEE CINCINNATI SECTION NEWSLETTER

OCTOBER MEETING

Solving Power Quality Problems

DATE : October 21, 1999

PLACE : Quality Inn Central in Norwood (lower level) - See directions below.

TIME : 5:00 to 7:00 PM (dinner)
7:00 PM (Program)
8:30 PM (Approx.- Adjournment)

COST: \$10.00 (Members)
\$ 5.00 (Students/Retired Members)
\$18.00 (Non-Members)

RESERVATIONS ARE REQUIRED FOR DINNER ONLY !!!

THE CINCINNATI SECTION NOW HAS ITS OWN VOICE MAILBOX for making reservations for meetings or for providing comments or suggestions to **YOUR** Executive Committee.

Please call the Cincinnati Section Voice Mailbox at 629-9380, by **Noon, Tuesday, October 19, 1999** if you plan to attend. Please leave your **Name, IEEE Member Number, and a daytime telephone number.**

ABOUT THE MEETING: Ronald F. Schapp, a member of IEEE and President of Alexander Equipment Company, Inc., will discuss solutions to disturbances in system/equipment, such as voltage sags, power interruptions, transient spikes and harmonic disturbances.

For over a decade, Mr. Schapp has participated in effective solution to these problems through problem definition and appropriate application of specific technologies and equipment.

MEETING LOCATION DIRECTIONS: From I-75 or I-71, get off at the Route 562 exit (Norwood Lateral). Then take the Montgomery Road exit off of 562.

Coming from I-71, at the end of the Montgomery Rd. Exit ramp, take a left onto Norwood Ave., follow to stop light and take a left onto Montgomery Rd. Hotel is approximately 2 blocks down on the right.

Coming from I-75, at the end of the Montgomery Rd. Exit ramp, take a left onto Wesley Ave. At next stop sign, turn left onto Norwood Ave. Follow to stop light and take a left onto Montgomery Rd. Hotel is approximately 2 blocks down on the right.

CHAIR'S MESSAGE

by Ron Harbaugh, Section Chair

We had an excellent program at the September Section meeting. Mr. Charles Dill and his colleagues conducted the program presentation in the offices of Fanuc Robotics North America, Inc. located in Mason, Ohio. The Fanuc staff put on an informative and entertaining show. There were a lot of impressed IEEE members that evening when the program was over. Those in attendance enjoyed the refreshments as well. A hearty thank you to the ladies and gentlemen at Fanuc for the experience.

We mentioned in the September newsletter of our planned Pace workshop scheduled on October 23, 1999. On that Saturday, we are conducting a Senior Membership Application Workshop. We have a volunteer group available to assist those members wanting to elevate their grade of IEEE membership. Contact Jim Everly if you have questions. Contact information is at the end of this newsletter.

We wish to remind everyone again about the Dielectrics and Electrical Insulation Society holding their conference at the Cincinnati Convention Center, October 25 through October 28, 1999.

Our next Executive Committee meeting is scheduled the evening of October 28, at the James Tavern in Blue Ash. The festivities will begin at 6:00 P.M. If you wish to attend or if you have any information for the Committee, please contact me or any member of the committee. All contact numbers are listed at the end of this newsletter.

UPCOMING SECTION MEETINGS AND TOPICS

October 28, 1999 - Executive Committee Meeting At James Tavern, 5:30 p.m.

December 2, 1999 - Section Meeting; Topic will be "Web Tools "

January 27, 2000 - Section Meeting; Topic will be " Appliance Applications – LINUX "

February 24, 2000 - Section Meeting (ESC Banquet)

March 23, 2000 - Section Meeting; Topic will be "Doppler Radar "

April, 2000 - Section Meeting; Topic will be "PACE "

May, 2000 - Section Meeting; Topic is undecided at this time.

Detailed information about the Section Meetings will be included in that month's newsletter. If you are interested in attending an Executive Committee Meeting, please contact either Ron Harbaugh or Jack Beckmeyer (see last page for phone numbers).

Senior Membership Application Workshop (Workshop limited to 20 applicants)

By Jim Everly, Vice-Chairman & PACE Representative

The Cincinnati Section of IEEE will sponsor a senior membership application workshop on Saturday, October 23, 1999. A volunteer group of Cincinnati Section IEEE Senior Members and IEEE Fellows will be available to assist section members with application forms and references. Section members interested in elevating their current member status to Senior Member grade should consider attend the workshop. The workshop is limited to 20 participants on a first come basis. If you have questions concerning the workshop please contact Jim Everly, Workshop Chairman, at j.everly@ieee.org or via my home telephone at (513) 777-7129. An answering machine is provided for your use in the event that I am not in when you call.

Workshop Information:

Date: Saturday, October 23, 1999
Time: 9:00 AM -1:00 PM
Place: University of Cincinnati
OMI College of Applied Science
Administration Building
Central Conference Room 204
2220 Victory Parkway
Cincinnati, Ohio
Parking: Lower Level (Back)

Reservations:

Please contact the Workshop Chairman, Jim Everly, by either E-mail or voice mail by Noon, Tuesday, October 19, 1999 if you plan to attend. Please leave your Name (spell completely so that Jim can make an accurate roster) and Telephone Number. Remember that space is limited to 20 applicants. You can contact Jim as follows:

E-mail: j.everly@ieee.org
Telephone: (513) 777-7129

Directions to the University of Cincinnati College of Applied Science:

FROM NORTH - I-71 South to Exit 3 (William Howard Taft); left a traffic light at end of exit ramp (Essex Avenue) crossing Taft. Left from Essex onto Mc Millan (one-way east); McMillan to Victory Parkway. Right on Victory Parkway, campus is about 0.3 miles on left side of street (just past Cypress).

FROM KENTUCKY- I-75 North to I-71 North (at Bridge) to Columbia Parkway (Route 50) to Kemper (first traffic light), turn left; to first street (Francis Lane)--Sharp right turn to Victory Parkway (at stop sign). College of Applied Science is on the right.

Applicants Should Bring the Following Information to the Workshop on Saturday:

- The completed Application Form together with an updated copy of your resume.
- Three (3) Xerox copies of the completed Application Form together with three (3) Xerox copies of your resume. This information will be used by the workshop committee to write letters of recommendation.
- Form reference letters and return envelopes supplied by IEEE in your Senior Member upgrade kit. Please complete these form letters as much as possible. The committee will complete the remainder of the form.

How to obtain the necessary Forms:

- On the Web -You can access the web-based Senior Member application and reference forms by visiting <http://www.ieee.org/organizations/rab/md/smforms.htm>. Please remember to indicate your Section (Cincinnati Section) in the "Nominating Section" box.
- Hard Copies - Printed applications and/or SM kits are available from IEEE by emailing d.barnosky@ieee.org or by mailing a request to: IEEE, Admissions and Advancements, 445 Hoes Lane, PO Box 1331, Piscataway, New Jersey 08855-1331 USA. The IEEE can also be contacted by phone at 800-678-4333.

Guide to Applying for IEEE Senior Member

IEEE Bylaw I-105.3 sets forth the criteria for elevation to Senior Member Grade, as follows:

... a candidate shall be an engineer, scientist, educator, technical executive or originator in IEEE-designated fields. . The candidate shall have been in professional practice for at least ten years and shall have shown significant performance over a period of at least five of those years. In order to qualify for Senior Member status, an individual must also provide three references from IEEE members holding Senior Member, Fellow or Honorary Member grade.

Five years of significant performance:

- A. Substantial engineering, responsibility or achievement
- B. Publication of engineering or scientific papers, books or inventions
- C. Technical direction or management of important scientific or engineering work with evidence of accomplishment
- D. Recognized contributions to the welfare of the scientific or engineering profession
- E. Development or furtherance of important scientific or engineering courses in a program on the "Reference List of Educational Programs"
- F. Contributions equivalent to those of (a) to (e) above in areas such as technical editing, patent prosecution or patent law, provided these contributions serve to advance progress substantially in IEEE designated fields.

Many prospective applicants make the mistake of assuming that "significant performance" requires special awards, patents or other extremely sophisticated technical accomplishments; such is not the case. Substantial job responsibilities such as team leader, task supervisor, engineer in charge of a program or project, engineer or scientist performing research with some measure of success (papers), or faculty developing and teaching courses with research and publications, all are indications of significant performance.

Ten years of professional practice: The A&A Committee evaluating applications credit years of educational experience toward years of professional practice as follows: 3 years for a baccalaureate degree in an IEEE-designated field; 4 years if baccalaureate and masters degrees are held; and five years for a doctorate.

NEW MEMBERS

The following individuals are IEEE members who are new to our Section:

PN V. ANAND
KURT R. BROWN
SATHEESH CHALLAVEERA
MIKE D. EISENSHANK
JEFFREY B. HIMES
MICHAEL J. HUFFENBERGER
RAMIN KOUSHA
KRISTINN KRISTINSSON
PAK L. KWAN

CHRISTINA M. MARTS
RICHARD R. PORTER
KENT B. RANDOLPH
CHRISTOPHER P. SABO
BARBARA L. SCHEIDE
THOMAS A. THORNTON
MIKE VADNEY
GEORGE J. VALENTINO

We wish to extend our welcome to all of our Section's new members!!!

Architects of the Net of Nets - Part 3

by Dick Reiman, Historian

Packet switching over copper telephone lines with Interface Message Processors (IMPS) connected at each end to interface with a host computer, had been demonstrated and met the criteria of no central routing control and could adapt to down lines. An additional feature directed the recipient of a message to send an acknowledgement to the source. If the acknowledgement was not received in time, the source re-sent the packet. To verify integrity of messages, each IMP used a checksum {a hashing function that uses each bit in a message to yield one sum after transmission for comparison with one another}. In addition, each IMP was programmed to be self-sufficient. If an IMP found its operating system to be damaged, it would request a replacement copy from a neighboring IMP or else shut down to prevent harm to the network.

In the early '70s, with over 15 sites connected, the Arpanet would prove not only efficient, but reasonably reliable too. Soon users would begin regarding it as an operational utility, rather than an experiment. As Bob Kahn, one of the founders noted, the large-scale network project combined "theory, simulation and engineering". Arpanet pioneers had proved the feasibility of packet-switching that underlies much of the networking today.

But in 1971, few people used the Arpanet and Kahn recalled "If you did log on, it was rare that you could do anything useful". So he and Larry Roberts, an ARPA executive, decided to make a splash at the International Conference on Computer Communications to be held at the Washington Hilton on Oct. 24-26, 1972. For the next 15 months, Kahn organized the show, aided by several dozen of the best programmers including Vincent Cerf, Jon Postel and Robert Metcalfe who developed programs for useful applications from medical to air traffic control.

Over 1000 people saw the show and marvelled at over 100 pieces of equipment functioning together reliably. From the success, Telnet, now part of Sprint's operating net work group, was created with Roberts himself heading the effort at BBN, the company who had developed the IMP. The show succeeded in legitimizing the notion of computer networking. During the month after the conference, traffic on the Arpanet jumped by 67 percent and has continued this pace even until today.

During the conference, the first computer communication global step was taken when the International Working Group was formed with Vincent Cerf as its chairman, a position he held for 4 years. Members included representatives from Britain's National Physical Laboratory and the French Cyclades packet-switching project.

Kahn moved on too as ARPA's program manager in Arlington, Virginia, a post he held for 13 years. It was a unique position from which to foster the Internet and to answer the need to communicate over multiple dissimilar networks. He undertook the advancement of packet satellite radio networks, a project with military advantages. Digital speech was difficult for an enemy to decipher if encrypted. Packets sent by satellites could reach ships at sea or forces on foreign lands. The radio network had different parameters and Kahn chose to solve their problems in a way that could be applied to connecting ARPA to other dissimilar networks.

ORIGINS OF RADIO

By Richard H. Englemann

I. Introduction

What were the origins of radio? Who first suspected or believed that there were electromagnetic waves? Who first demonstrated that such waves could actually be brought into existence? Who was first to show that it was possible to communicate by use of these waves? If you look into the origins of radio and try to determine when

and by whom it was suspected that there could be such entities as radio waves, you are almost immediately immersed in a sea of imprecise or even nonexistent definitions, with the result that the answers to those questions are far from clear cut.

For example, The New IEEE Standard Dictionary of Electrical and Electronics Terms [1] does not even include a definition of "radio," although "radio" appears in numerous entries in combinations such as radiolocation and radio controlled. Standard dictionaries, such as a Webster's [2] or American Heritage Dictionary [3] define "radio" in different ways. Reference [2] defines it as "The practice or science of communicating over a distance by converting sounds or signals into electromagnetic waves and transmitting these directly through space, without connecting wires, to a receiving set, which changes them into sound; wireless telephony or telegraphy." Reference [3] defines it as "The use of electromagnetic waves in the approximate frequency range from 10 kilocycles/second to 300,000 megacycles/second to transmit or receive electric signals without wires connecting the points of transmission and reception." The first of these definitions has the advantage that it is imprecise as to the frequency range; ELF (extra low frequency) transmission is allowable under this definition, whereas it is not under the second. However, the first definition limits the end "product" to sound. What if the output of the receiver is displayed in some other form, such as light? Or what if the output of the receiver is used to actuate a relay?

For our purposes, we will use a broad definition, very similar to that from Reference [3], but omitting the limitations on frequency range. This definition therefore permits outputs other than sound. We will refer to this as the "broad" definition; a "narrow" definition will require that the output be sound.

II. Maxwell's Predecessors

James Clerk Maxwell's ideas did not spring full-blown into existence, but were founded on work done by others before him, and based on concepts formulated by his predecessors. There was, of course, a long succession of scientists and experimenters whose work led up to Maxwell's achievements, beginning with Thales of Miletus and his experiments with static electricity. Names such as Franklin, Cavendish, Volta, and Oersted are part of the roster of contributors, but probably the three men whose work most influenced Maxwell's thinking and which certainly provided the foundation for his work were Charles Augustin de Coulomb, Andre Marie Ampère, and Michael Faraday.

Coulomb's contribution was establishment of the principle that the force between two charged particles is directly proportional to the product of their charges and inversely proportional to the square of the distance between them, the principle known as Coulomb's Law. Ampère's contribution was the insight that magnetism is an effect due to electrical current, and that it was possible to predict from equations that he formulated what the forces would be on two parallel, current-carrying conductors. How were these electrostatic and magnetic forces produced? The standard answer was "Action at a distance."

The link between Coulomb's and Ampère's work to Maxwell's Laws was provided by Faraday's brilliant concept of a field. What is a field? It is not a tangible entity; we can't see it, hear it, taste it, or smell it. (It was at one time characterized as mechanical stresses and strains in the ether, an elastic solid material pervading all space, a concept that has long since been discarded.) We can measure the effects of a field, however, and it is the measurement of those effects and especially their predictability that enable us to talk about fields as if there were some tangible entity present and to have confidence in the results of calculations based on the concept of a magnetic or electric field. Entirely apart from any physical meaning that a field may be thought to have (such as a repository for stored energy), we may consider the idea of a field to be a mathematical crutch to help us along with our thinking about electromagnetic phenomena, and that, correctly used, this crutch enables us to predict the outcome at one point of an action at another. (The ether was a crutch for a while, and certainly helped scientists of the time in their thought processes. Maybe we'll be able to relinquish the "field" crutch some time in the future.)

It was Maxwell who synthesized the results and the thinking of his predecessors into a set of basic equations of electromagnetic theory. The results, published in 1855, were modified six years later by inclusion of displacement currents so as to remove a defect in Ampère's circuital law. Maxwell had arrived at a final form for his Laws. Although we generally think of those Laws as being summed up in two concise curl and two concise divergence equations, when Maxwell died in 1879 he left them as a set of twenty equations in twenty variables. The forms we know today were published by Oliver Heaviside in England in 1885 [4], but we do not know when he actually did the work. Reduction to these forms was also done by Heinrich Hertz in Germany in 1884. Which of the two had priority is apparently a question that cannot be settled, and it made no difference to the two, who corresponded in a friendly manner from time to time, although they never met (apparently by the reclusive Heaviside's wish). The question of priority is similar to the Leibniz-or-Newton priority question in calculus.

III. Maxwellian Waves

Did Maxwell believe that electromagnetic waves (that is, radio waves) were possible? He certainly did, as is shown by the fact that he made calculations from data available to him on the relative strengths of electric and magnetic forces leading to the conclusion that such waves should propagate at a speed of 193,088 miles per second, which was within 1% of the speed of light as then known. In making this comparison, Maxwell was, by implication, making the statement that light consisted of electromagnetic waves. He also was making the statement that electromagnetic waves at frequencies other than those of visible light were possible.

As might be guessed, not everyone believed that Maxwell had been able to synthesize the work of so many others and (after the intervention of Hertz and Heaviside) into such a compact form. The scientists on the Continent remained faithful to the action-at-a-distance concept[4]. William Thomson (later Lord Kelvin) apparently never quite believed what Maxwell taught. Professor George Francis Fitzgerald, of Trinity College in Dublin, who began in 1879 by believing Maxwell to be wrong (and admitting later that his ideas were "more or less idiotic") was converted by 1882 and the following year he proposed an experimental approach for generating Maxwellian waves by . . . discharging condensers through circuits of small resistance . . . so as to . . . obtain sufficiently rapid alternating current . . . That is, he was proposing to build underdamped inductance-capacitance circuits, taking advantage of their series resonant properties. There is no evidence that Fitzgerald ever carried out the experiment, but it is of interest to note that he made this proposal in 1883, twelve years before Marconi reported a successful experiment with radio waves in Italy.

Was Fitzgerald however anticipated by Heinrich Hertz? Or was Hertz anticipated by Fitzgerald? Or were both of them anticipated by someone else? Hertz, between 1886 and 1889, had demonstrated that electromagnetic radiation could be generated, that it propagated with the speed of light, that the waves were transverse, and that they could be polarized. He thus confirmed that the waves predicted by Maxwell's Laws differed from light waves only in frequency. The honors for having the idea first seem to go to Fitzgerald, but the honors for demonstration go to Hertz! It is possible, however, that both Fitzgerald and Hertz had been anticipated by David Hughes. [Who? Never heard of him!]

David Hughes was a prolific and successful English inventor, so prolific that, at his death early in this century, he left an estate of almost half a million pounds. [His invention of a microphone, for example, very likely preceded that by Edison.] Yet, in some ways, he was a bumbling engineer, never being exactly certain what the results of his own experiments meant, and having insufficient self confidence to argue for his views if challenged. It was these traits that may have resulted in his never achieving fame as the inventor of radio. In 1879 he demonstrated equipment that he believed showed the generation and detection of electromagnetic waves. Those in attendance at the demonstration were several prominent English "electricians," including a man named William Henry Preece (a friend of Hughes), who had the title of Electrician and Engineer-in-Chief of the British General Post Office. Preece was a politician; as an "electrician" he has been described as

borderline incompetent. A book on telegraphy, of which he was joint and senior author, was published in 1876. A review of the book in *Nature* included the devastating sentence: "Everything scientific is in fact left out."

The most important person in the group to which Hughes demonstrated his equipment was Preece. Those in the group all agreed (to keep on the good side of Preece?) that: all the results could be explained by known electromagnetic induction [emphasis added] effects; and "would not accept my view of actual aerial electric waves." Hughes apparently let the matter drop at that point, having anticipated Fitzgerald by four years and Hertz by at least seven years, and the story never came to the attention of others until 1901.

All the work to this point, while extremely necessary, did not result in communication, although Hertz had definitely demonstrated radio under the broad definition above, and Hughes (about whose equipment we have no knowledge other than the little he provided twenty-some years after the fact) may have demonstrated radio using either the broad or the narrow definition. Whichever it was in Hughes' case, if indeed there was actual radio transmission, is unimportant because there was never a public demonstration, there were no publications concerning the work, and the effect on the scientific world was nil. Similarly with Fitzgerald, who had merely suggested a method but had not demonstrated that it would work.

No one had as yet shown anything that had practical value. No messages had been sent and received, other than that the transmitter is on or it is off. Hertz, except for his untimely death on January 1, 1894, following a long illness, would probably have reached a practical stage in a few years, although others were close on his heels.

IV. Radio Communication

On May 20, 1891, Nikola Tesla delivered a lecture to the American Institute of Electrical Engineers, in New York, on the subject "Experiments with Alternate [sic] Currents of Very High Frequency and Their Application to Methods of Artificial Illumination." The lecture in its entirety appears as Chapter XXVI in Reference [5]. Tesla's lectures were almost always accompanied by demonstrations, and this occasion was no exception. Some of this lecture was directed toward the methods he had used in the construction of alternators that would generate high frequencies. One of the alternators described had 384 poles, and another had 480. Although the prime mover speed is not mentioned, a little calculation shows that a shaft speed of about 5,000 rpm will produce a frequency of about 20,000 cycles per second, and Tesla later on in his lecture refers to ". . . currents alternating only 20,000 times a second . . ." Most of the remainder of the lecture is concerned with the nature of the arcs produced by terminals on induction coils attached to the alternator. The important point to note is that Tesla was producing voltages which lie in a radio frequency range.

In February, 1892, Tesla delivered a lecture to the Institution of Electrical Engineers in London, again on the subject of alternate currents of high potential and high frequency. The circuit diagrams shown with this lecture include tuned circuits. The principal objective was to produce illumination by discharges through Crookes tubes.

A year later (February 1893), Tesla spoke to the Franklin Institute in Philadelphia, and he delivered essentially the same lecture in March to the National Electric Light Association in St. Louis. The subject this time was "On Light and Other High Frequency Phenomena." One of the figures shows a number of inductance-capacitance (LC) circuits with associated spark gaps which were used in various demonstrations for the lecture. The LC circuits were underdamped oscillatory circuits, which Tesla tuned as necessary to produce the desired frequency, generally in the range of 20,000 cycles per second. In another figure he shows two antennas attached to alternators with a ground connection ("conveniently to the water mains"). In his description of this figure he refers to a source (transmitter) and to the possibility of ". . . realization of the scheme of transmitting intelligence. . ." by substitution of a receiver for one of the alternators. A key element in many of his circuits was the "tank" (LC) circuit; another key element was the fact that the circuit was grounded.

One of the demonstrations at these lectures was described later by Tesla's assistant, H. P. Broughton:

On the auditorium stage a demonstration was set up by using two groups of equipment. In the transmitter group on one side of the stage was a 5-kVA [?] high voltage pole-type oil-filled distribution transformer connected to a condenser bank of Leyden jars, a spark gap, a coil, and a wire running up to the ceiling. In the receiver group on the other side of the stage was an identical wire hanging from the ceiling, a duplicate condenser bank of Leyden jars and coil; but instead of the spark gap, there was a Geissler tube that would light up like a modern fluorescent lamp bulb when voltage was applied. There were no interconnecting wires between transmitter and receiver.

The transformer in the transmitter group was energized from a special electric power line through an exposed two-blade knife switch. When this switch was closed, the transformer grunted and groaned, the Leyden jars showed corona sizzling around their foil edges, the spark gap crackled with a noisy spark discharge, and an invisible electromagnetic field radiated energy into space from the transmitter antenna wire.

Simultaneously, in the receiver group, the Geissler tube lighted up from the radio-frequency excitation picked up by the receiver antenna wire.

Thus wireless was born. A wireless message had been transmitted by the 5-kilowatt [?] spark transmitter, and instantly received by the Geissler-tube receiver thirty feet away.

Did this demonstration place Tesla first in line as far as radio was concerned? If one accepts the excitation of the Geissler tube as the reception of a signal, it would seem so. He pursued his ideas far enough that he was able to demonstrate reception at a distance of 25 miles, the receiving apparatus having been placed on a boat on the Hudson River. Patent applications were filed in 1897, and the resulting patents issued in 1900. In 1898 he filed for a patent on radio remote control for use in guiding vehicles, and that patent (#613,809) issued the same year. His remote control had been demonstrated at Madison Square Garden that year, using a model boat.

Tesla presented his lectures on high frequency and the effects possible with his circuits in 1893 and earlier. In 1894, Sir Oliver Lodge sent and received signals at Oxford. He clearly had in mind uses of electromagnetic waves for communication purposes, and as part of this work he devised a detector (the "coherer") in order to convert the received signal into a usable form. In 1895, Marconi transmitted signals for short distances in Italy. Later, in England, he was able to achieve transmission distances of fifteen miles, but it was not until 1901 that he demonstrated transmission across the Atlantic. Even then, he had to modify his apparatus from its original form to include Tesla's LC circuits and circuit grounding.

It seems rather clear that Tesla was actually the inventor of radio, but that he did not develop it into a usable device for communication purposes. That honor belongs to Marconi, and Marconi also filed patent applications and received patents. The result was a lawyer's paradise; litigation that went on for many years, being finally settled in Tesla's favor by the U. S. Supreme Court on June 21, 1943, five and one-half months after Tesla had died, and six years after Marconi's death.

An interesting sidelight to Tesla's work (and completely unrelated to radio) is that in his remote controlled boat he used AND circuits (although he did not call them that) to prevent false operations. When computer circuits were being developed, an application was filed on the AND circuit. It was denied, as having been previously disclosed by Tesla!

REFERENCES

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IEEE NEWS

NEW IEEE-USA SALARY WORKBOOK HELPS ELECTROTECHNOLOGISTS EARN WHAT THEY'RE WORTH

Washington, August 17, 1999 -- IEEE-USA has published the latest version of *SALARY BENCHMARKS: A PERSONAL WORKBOOK*, a tool for electrotechnologists who are evaluating their market value in today's labor market. According to the publisher, the product is designed to answer two questions for employees: Are you getting paid what you're worth? And, How do you know?

Based on data and analysis from the current IEEE-USA Salary Survey, the Workbook provides a personal salary estimate that allows engineers to factor in their individual circumstances for their current or prospective future job, including 75 variables such as location, experience, industry, education and other economic and demographic characteristics.

Last year, a study of 50 engineer volunteers found that the Workbook estimated their current salaries within an average of \$800 of their actual salaries. According to one study participant: "There is sound basis for the numbers which would be hard to dispute by an employer. If an employee wanted a better feeling for his or her pay, then this is a good avenue to find out."

SALARY BENCHMARKS: A PERSONAL WORKBOOK is available for \$14.95 to IEEE members and \$19.95 to nonmembers by calling 1-800-678-IEEE. Ask for Product no. UH-2982.

IEEE PUBLISHES ALL-INCLUSIVE COMPENDIUM ON RADAR TECHNOLOGY

PISCATAWAY, NJ, August 27, 1999 – The IEEE announces the release of Radar Essentials, a compendium of the most current and most classic articles and papers on radar technology. Radar technology has advanced at a breathtaking pace during the last decade of the 20th century, with a new generation of radar systems permeating military and commercial markets. The articles and papers in Radar Essentials address the following topics:

- History of radar
- New and proposed radar systems
- New radar components
- Recent advances in radar technology
- Radar simulation and modeling
- Insight into select foreign radar systems, and more!

Editor J.M. Kawecky has carefully selected the most important papers to include in this compendium. With more than thirty years of experience in the design and production of communications, television, and radar transmitters, Mr. Kawecky has pioneered significant technological advancements, including the first gridded Traveling Wave Tube (TWT) to be used in radar application. His work has proved invaluable to the RF/radar/electronic warfare community in solving RF and electronic warfare problems.

To order Radar Essentials--List price \$69.95; IEEE Member price \$49.95--use product number SR109-QVE. Order from IEEE Customer Service, 445 Hoes Lane, PO Box 1331, Piscataway, NJ 08855-1331, USA; E-mail, customer-service@ieee.org; Phone: 1-800-678-IEEE (1-732-981-0060 outside the USA and Canada).

NEW WEBSITE INTRODUCES KIDS TO PATENTS AND TRADEMARKS

WASHINGTON, DC , Sept. 2, 1999 --As part of the National Inventor's Month celebration, the U.S. Patent and Trademark Office (PTO) has launched a website that is designed to provide patent and trademark information in a language that children can understand and expose future inventors and entrepreneurs to the inventive thinking process in a positive, fun environment. Resources are targeted at primary and secondary school students and for parents, teachers and coaches, and include such features as a daily calendar of patents and trademarks, educational stories and games, and links to other government kids' pages. See <http://www.uspto.gov/go/opa/kids/index.html>

STATES ANNOUNCE S&T INITIATIVES

WASHINGTON, DC, Sept. 10, 1999 -- Two states have recently announced major new science and technology initiatives.

The Kentucky Science and Technology Corporation (KSTC) has released Kentucky's new Science and Technology Strategy, which outlines ten specific recommendations for adoption by Kentucky legislators to help guide the Commonwealth's future R&D investments. Among the key recommendations are use of state pension funds for business investments, raising pay of K-12 math & science teachers, establishment of a Strategic Technology Capacity Initiative to support formation, recruitment and location of industry R&D consortia and anchor businesses in Kentucky, use of R&D vouchers to encourage small and medium-sized businesses to enter into R&D partnerships with Kentucky colleges and universities, and establishment of a statewide manufacturing modernization system and regional technology service corporations. For more information, consult that KSTC website at: <http://www.kstc.org/index.cfm>

In Indiana, Governor Frank O'Bannon has named the Board of Directors responsible for administering the state's new 21st Century Research & Technology Fund, a two year, \$50 million initiative that will provide loans and grants to help Indiana universities, businesses and non-profit organizations compete for federal and private-sector R&D funds, stimulate technology transfer and commercialization through targeted investments in biomedical research, biotechnology, information technology, and other high tech industry clusters, and encourage an environment of innovation and cooperation among universities and businesses to promote research activity. For more information, see <http://www.21stcentury-research.org>.

IEEE-USA WANTS YOU TO APPLY FOR AN FCC FELLOWSHIP

WASHINGTON, Sept. 15, 1999 -- IEEE-USA is seeking an IEEE U.S. member interested in spending a year as an Executive Fellow at the Federal Communications Commission beginning in June 2000 through May 2001. The Fellow would be assigned to the FCC's office of Engineering and Technology to support a number of important projects involving new, advanced, and alternative telecommunications technologies, particularly in the wireless and network areas.

Selection criteria include U.S. citizenship, Member grade or higher, and a strong technical knowledge in the relevant areas. But to avoid a conflict of interest, Fellowship candidates may not presently be employed by, or

have a significant interest in, companies that are regulated by the FCC. The Fellowship provides a stipend of \$50,000. Deadline for receipt of applications is Dec. 3, 1999.

IEEE Society/Section Newsletter and Magazine Article
September 20, 1999
IEEE Standards Association (IEEE-SA)—As Year Two Comes to a Close

Members of IEEE's Technical Societies need to be kept current on the latest news from the IEEE-SA. We are coming to the end of our second year and are better positioned to assess the SA's accomplishments, unresolved issues, and future challenges.

When the IEEE-SA was launched, our promises to you included: 1) an election of the governing body, 2) expanded opportunities for standards development under the Standards Board, and 3) even further standardization opportunities outside of the Standards Board. How are we doing?

We've given IEEE-SA members a voice in the governance. The first election of the President of the SA and the members-at-large of the IEEE-SA Board of Governors (IEEE-SA BOG) is underway. The election process was approved by the IEEE Board of Directors in November 1998. Members of the IEEE-SA can elect the members-at-large of the IEEE-SA BOG, and members of the IEEE-SA who are also IEEE members may elect the IEEE-SA President. The position of President-Elect was also created to allow for continuity of leadership.

Issues and challenges: Some volunteer standards developers don't see the value of being part of a constituency with the above-mentioned electoral privileges. The goal of an election is to bring forward individuals with leadership abilities, industry involvement, and strong interest and experience in the standards activities of the Institute. The more vested the interest, the better are the results for the standards constituency.

IEEE standards developers have new voting options: The IEEE Standards Board has approved entity and mixed balloting (e.g., corporate balloting and/or corporate with individual balloting, respectively) to add a new dimension and opportunity to the IEEE standards consensus process. It is important to remember that the IEEE-SA Bylaws include several new membership categories, such as company, government agency, and organization. Now, an IEEE committee can declare at the outset of its project (PAR) that it will proceed with a corporate-level ballot, a ballot including company representatives and individuals, or the traditional individual-based ballot. IEEE hosts a broad range of standards programs, coming from diverse industry sectors. IEEE's various industry groups require options for proceeding rather than a "one size fits all" policy.

Issues and challenges: IEEE's standards developers cover a broad spectrum of industry types. What works for the power interests may not apply to the telecommunications groups or the design automation committees. Yet, we need to sensitize each sector to this fundamental fact, so that our participants experience the process options as a strength rather than a threat to the quality of the IEEE standards program.

A new organization has been formed that allows IEEE to provide a full range of standards services to its members and their industries: Over the last several years, we have been keenly aware of the proliferation of industry groups that have formed for the purpose of developing industry standards and running related programs. These groups formed because they found that the IEEE was not able to respond adequately and quickly enough to the market demands of their technologies. We had to ask ourselves, Why shouldn't this work be done in the IEEE? These are IEEE technologies! And as a result the IEEE-SA developed the IEEE Industry Standards and Technology Organization (IEEE-ISTO), which was approved by the IEEE Board of Directors in November 1998 and launched on January 1, 1999.

The new organization's goals complement the activities of the IEEE-SA. The IEEE-ISTO provides a forum in which development processes and related activities can be tailored to the technology, market, and participants. It also offers support for industry-specific post-development activities, including marketing, certification, branding, and conformity assessment. The Medical Device Communications Industry Group was the first group to organize within the IEEE-ISTO. Two more groups have signed up for services, and several more are in the negotiation phase.

Together, the IEEE-SA and the IEEE-ISTO enable the IEEE to offer industry an unprecedented level of choice through a complete menu of standards activities and services.

Issues and challenges: The IEEE ISTO must provide proof of concept that it can function as a supplier to the Societies and the Standards Board, not a competitor.

Our goals for this year have included an aggressive globalization program, new product and service opportunities, and increased communication and improved relationships with the IEEE Technical Societies. We will keep you informed through this newsletter and other media, and we welcome your thoughts and comments.

Judy Gorman, Managing Director, IEEE Standards

WEBCASTING/SATELLITE SERIES ON PROJECT MANAGEMENT NOW AVAILABLE TO IEEE MEMBERS

PISCATAWAY, NJ, September 24, 1999 – The IEEE, together with the International Institute for Learning, Inc. (IIL), is offering to IEEE members a 10% discount on the webcasting/satellite training series Hot Topics, Tools and Techniques in Project Management. Beginning 21 October 1999, registered IEEE members can watch the six, three-hour live broadcasts via satellite at locations throughout the U.S., or access the entire program via the Internet at any time during and after the live broadcasts. The series will be simultaneously translated into Spanish.

Designed to bring applicable project management methods to thousands of individuals around the world, the series will cover the following topics:

Project Management Overview	October 21, 1999
Meet or Exceed Customer Expectations While Minimizing Scope Creep	October 28, 1999
Schedule and Budget Your Projects Using WBS and CPM	November 4, 1999
Control Your Projects Using EVA	November 18, 1999
Project Management Entrepreneurship & Risk Management	December 2, 1999
Manage Multiple Projects and Replicate Success	December 9, 1999

For those watching the broadcasts live via satellite, each session will run from 11:00 a.m. to 2:00 p.m., eastern standard time. The lead instructor for this series is Dr. Al. Zeitoun, and select topics will be taught by IIL's accomplished instructors in project management. Participants are eligible to receive 1.8 CEUs and 18 PDUs. IEEE members receive a 10% discount off the list price of \$500 per person or \$6000 per site license.

To register or receive information on satellite downlink locations, how to access the series via the internet, and site licenses, contact IIL via the internet (www.iil.com), phone (800.385.4350 or 417.236.0992), fax (417.236.0964), or e-mail (learning@iil.com). To speak with a representative from the IEEE about the program, contact Alan Trembly at [<a.trembly@ieee.org>](mailto:a.trembly@ieee.org).

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